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General Notes.

MINERALOGY.[1]

Vicinal Planes and the Variation of Crystal Angles.—Miers[2] has measured by means of a specially constructed goniometer[3] the changes in the form of crystals during their growth. Potash and ammonium alum is a substance whose apparently octahedral crystals are subject to noticeable variations in the size of the octahedral angle, and whose faces are sometimes vicinal in character. Miers began an investigation to determine whether the angles subject to variation have different values at different stages in the growth of the crystal, and if so, whether the faces change their inclination during growth, provided the crystal is held fixed. He has made the following important observations:

(1.) The faces of the regular octahedron are never developed on alum growing from aqueous solution.

(2.) The reflecting planes (which are often very perfect) are those of a very flat triangular pyramid (trisoctahedron).

(3.) The three faces of this triangular pyramid may be very unequal in size.

(4.) The trisoctahedron which replaces one octahedral face of a crystal may be different from that which replaces another face of the same crystal.

(5) During the growth of the crystal the reflecting planes change their mutual inclinations; the trisoctahedron becomes in general more acute, i. e., deviates more from the octahedron which it replaces as the crystal grows.

(6.) This change takes place, not continuously, but *per saltum*, each reflecting plane becoming replaced by another which is inclined to it by a small angle (generally about three minutes).

(7.) During growth the faces are always those of trisoctahedrons; but, if for any reason, as rise of temperature, re-solution occurs, icositetrahedrons are developed.

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[1] Edited by Dr. Wm. H. Hobbs, University of Wisconsin, Madison, Wis.

[2] Abstract of paper read before the British Association. Nature, **50** pp. 411–412. (August 23d, 1894.)

[3] See these notes, March, 1895.

Thus it is shown that, in this case at least, crystals do not grow by the deposition of parallel layers of substance, but that new faces are constantly being developed which obey the law of rational (though not simple) indices. Their mutual inclinations in the case of alum show that the face to which they approximate is always the octahedron with angle 70° 31¾′, hence the faces of this form do not vary their inclination as supposed.

Determination of the Principal Indices of Refraction for the most Important Rock-making Minerals.—Zimanyi[4] has determined by the method of total reflection (using a modified Kohlrausch total reflectometer) the principal indices of refraction, and hence, at the same time, the double refraction, of the more important rock-making minerals. He has found that methylene iodide, which has not before been used with the total reflectometer, is a particularly good enclosing medium, since it was found to suffer scarcely any change in the course of an entire year. His paper gives the results of a very extensive series of determinations on no less than fifty-five species or varieties. A few of the determined values are given below:

Mineral.	*Mean index of refr.*	*Double refr.*	*Opt. Char.*
Albite (Schmirn).	1.5337	0.0105	+
Elæolite (Laurvik).	1.5350	0.0042	—
Nepheline (Vesuvius).	1.5407	0.0050	—
Orthoclase.	1.5222	0.0064	—
Sodalite (Ditro)	1.4834		
Nosean (Laach).	1.4950		
Hauyne (Latium).	1.5027		
Leucite (Vesuvius).	1.5086		
Cordierite (Bodenmais).	1.5396	0.0091	—
Muscovite (Buckfield).	1.5861	0.0388	—
Augite (Pojana).	1.7000	0.0250	—?
Biotite (Diff. localities).	1.5600–1.5894		
Tremolite (Diff. localities).	1.6117–1.6135	0.0252–0.0270	—
Actinolite (Diff. localities).	1.6150–1.6257	0.0271–0.0280	—
Tourmaline (Diff. loc.)	1.6324–1.6357	0.0184–0.0239	—
Amphibole (Kafveltorp).	1.6463	0.0163	+
Sillimanite (Saybrook).	1.6641	0.0200	+
Olivine.	1.6710	0.0359	+
Zoisite (Tyrol).	1.7010	0.0050	+

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[4] Zeitsch. f. Kryst., XXII, pp. 321–358 (1894).

New Minerals.—Igelstrom[5] describes several supposed new minerals from Sjögrube, Gouv. Orebro, Sweden, which are either massive or so poorly crystallized that their symmetry could not be definitely determined. Their names and supposed compositions are as follows:

Lamprostibian.—A qualitative analysis showed the presence of much Sb_2O_5 and FeO, with smaller amounts of MnO, As_2O_5, PbO, "and other substances;" from which the mineral is supposed to be an antimonate of iron and manganese.

Elfstorpite.—A qualitative determination yielded much H_2O, As_2O_3 and MnO, with traces of CaO and MgO, hence the mineral is supposed to be a very hydrous arsenate of manganese.

Chlorarsenian.—Anhydrous arsenate of manganese (from qualitative tests).

Rhodoarsenian.—Analysis furnished the following formula:

$(10\ RO\ As_2O_5)+10\ (RO\ H_2O)$ in which R=Mn, Ca, and Mg.

Basiliite.—$(Mn_2O_3)_4\ Sb_2O_5+7\ Mn_2O_3.\ 3\ H_2O$.

Sjögrufvite.—$2\ (RO)_3\ As_2O_5+Fe_2O_3.\ As_2O_5+6\ H_2O$, in which R= Mn, Ca, and Pb.

Doelter, The Characters of Gems.—Eight years ago Groth issued a very interesting popular introduction to the study of gems, intended for the general public and also in a special way to inform jewelers of the delicate mineralogical methods which may be made use of by them for the determination of stones.[6] Great stress was laid upon the optical method of investigation, and a special microscope was designed and constructed for the use of jewelers. Doelter[7] has recently published a more pretentious work, and one of a somewhat more practical character. The book is essentially a manual and includes some 260 pages. It contains a great deal of matter and this is very well arranged. Doelter shows that in spite of the delicate nature of the optical methods, they can only rarely be applied on cut gems. The specific gravity test, particularly when heavy solutions are used, is the most delicate test, and also the one most easily applied. In addition, the examination with the dichroscope, and chemical and hardness tests, are applied in some cases. The artificial reproduction of the different gems in the laboratory, and the technical methods of imitating the valuable gems are given in detail. The greater part of the work is devoted to the detailed descriptions of the individual types of stones. In the third part of the work is given a systematic method of examining a stone, with a key for use in the determination. A chapter is devoted to the means of identifying the various imitations in use in the trade. A list of 250 trade names of gems, with the scientific name of the mineral and the group in which it belongs in parallel columns, will prove of great value for reference.—W. H. HOBBS.

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[5] Zeitsch. f. Kryst., XXII, pp. 467–472 (1894).

[6] Grundriss der Edelsteinkunde, Engelmann, Leipzig, 1887.

[7] Edelsteinkunde, Bestimmung und Unterscheidung der Edelsteine und Schmucksteine, die künstliche Darstellung der Edelsteine, von Dr. C. Doelter. Veit & Comp., Leipzig, 1893.

PETROGRAPHY.[1]

Rock Differentiation.—Harker[2] contributes an interesting article on rock differentiation in his study of the gabbro of Carrock Fell, England. The hill in question consists of bedded basic lavas, gabbro, granophyre and diabase in the order of their intrusion. The gabbro is of especial interest, since it presents a simple example of rock differentiation. In its center the mass is quartziferous. Toward the periphery it passes gradually into an ordinary gabbro, and immediately upon the border into an aggregate composed largely of titaniferous magnetite. In explaining the causes of this gradual transition in chemical and mineral composition, the author discards the theories usually proposed to explain similar phenomena, and concludes that, in the case under discussion, the separation of the magma into its parts took place during the period of crystallization by concentration of the crystallizing substances. The concentration is greatest for those minerals belonging to the earliest stages of the rock's history, hence it is thought that the differentiation took place by diffusion in a fluid magma, and that in those parts of this magma richest in basic minerals crystallization first occurred. As the crystals separated, the supply of the crystallizing substance was kept up by diffusion from other portions of the magma into the basic portions.

Another interesting feature of the gabbro mass relates to the contact effects produced by the rock in the surrounding basic lavas, some of which are enclosed as fragments in the midst of the gabbro. Their isotropic base has crystallized, and some changes have been produced

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Maine.

[2] Quart. Journal Geol. Soc., 1894, p. 311.